

Retinal Specialisations: from Fish to Mammals

ANIM3320

Comparative Neurobiology

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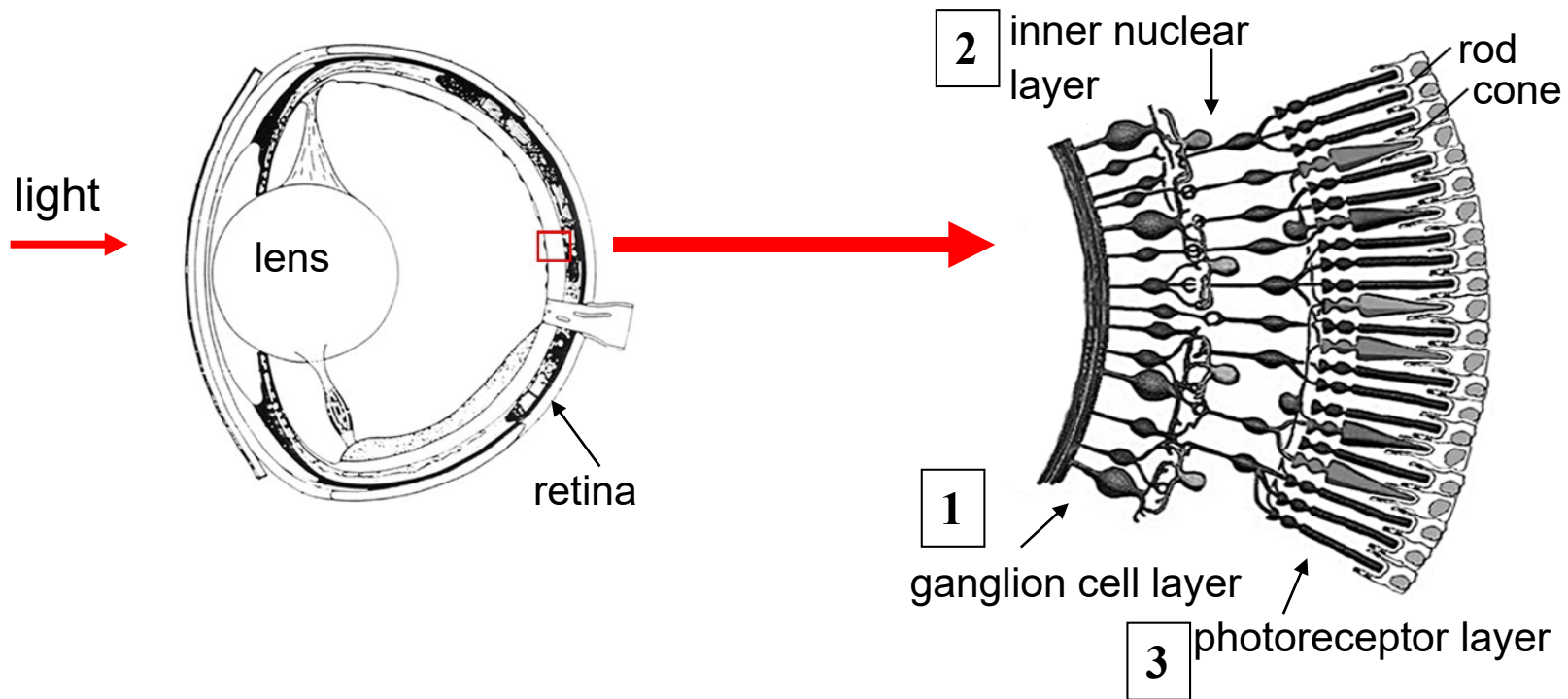
Visual system

- general basic pattern
- different specialisations: **tasks** and **environment**



Retina = neural tissue upon which images of outside world are projected and mapped to the brain

Vertebrate retina: 3 layers

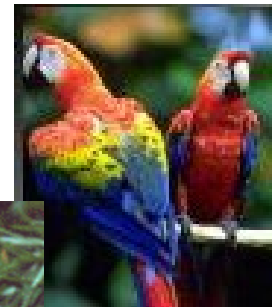
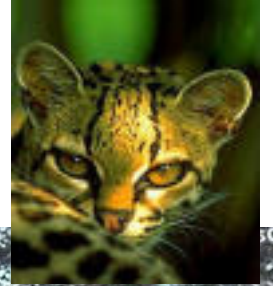


1. ganglion cell layer: information conveyed to brain via optic nerve
2. inner nuclear layer: signals relayed to ganglion cell layer
3. photoreceptor layer: visual image transformed into electrical signals (neural image)

Retinal specialisations

1. visual priorities and tasks:

- prey/predator detection
- feeding strategies
- locomotion



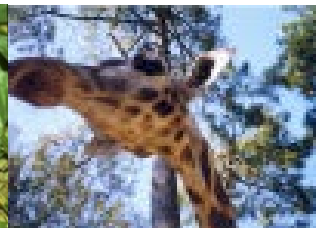
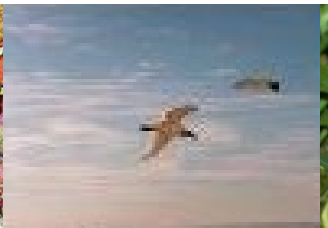
Retinal specialisations

2. light environment:

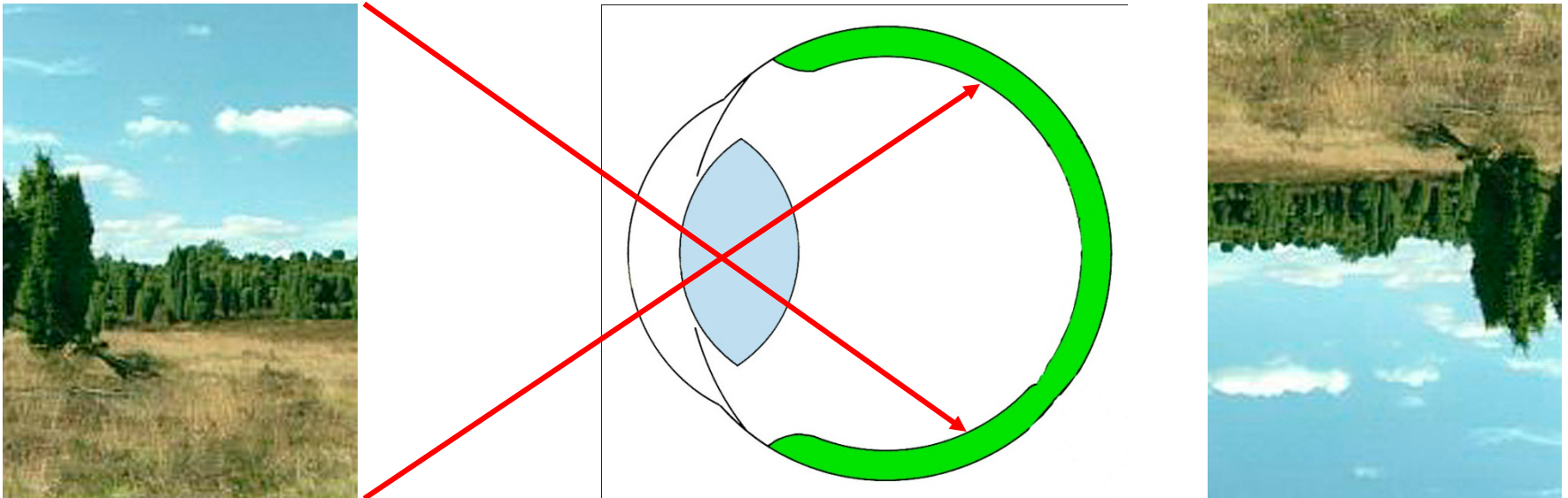
- activity pattern: diurnal, nocturnal, crepuscular, arrhythmic



- habitat: aquatic, terrestrial, sky, open land, dense forest, underground etc...



Different areas of the retina "see" different parts of the world

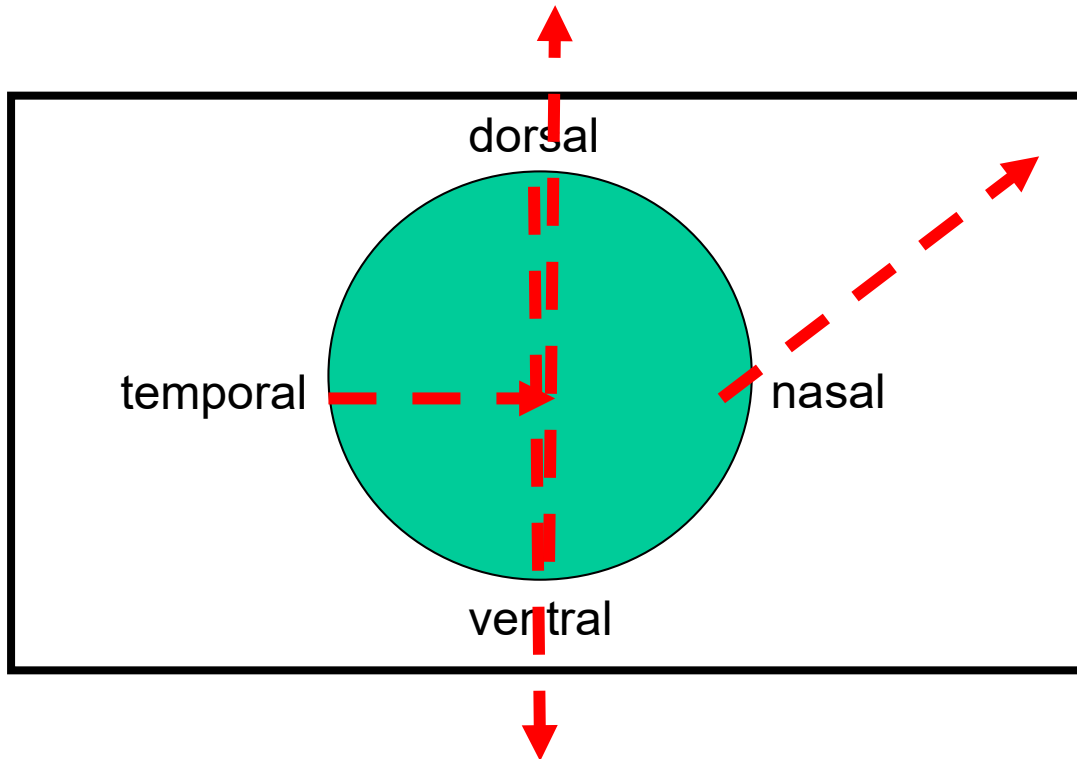


The lens inverts and flips the image

When looking at retinal wholemounts...

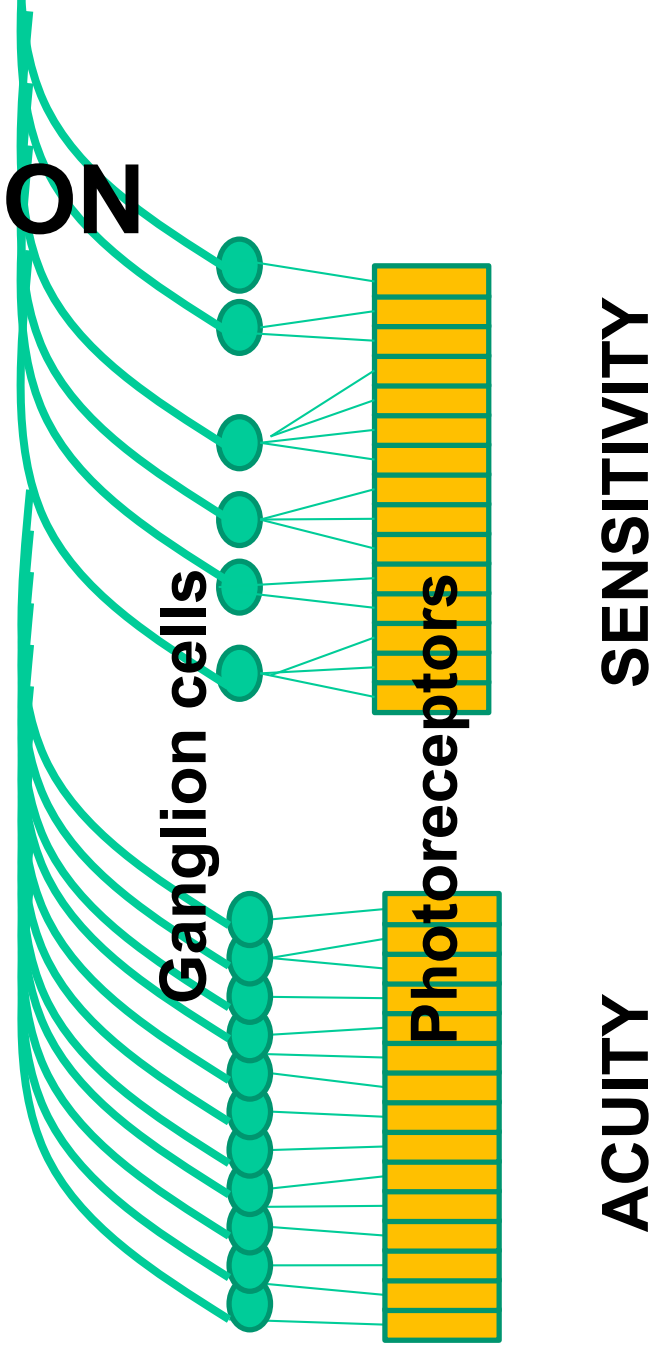
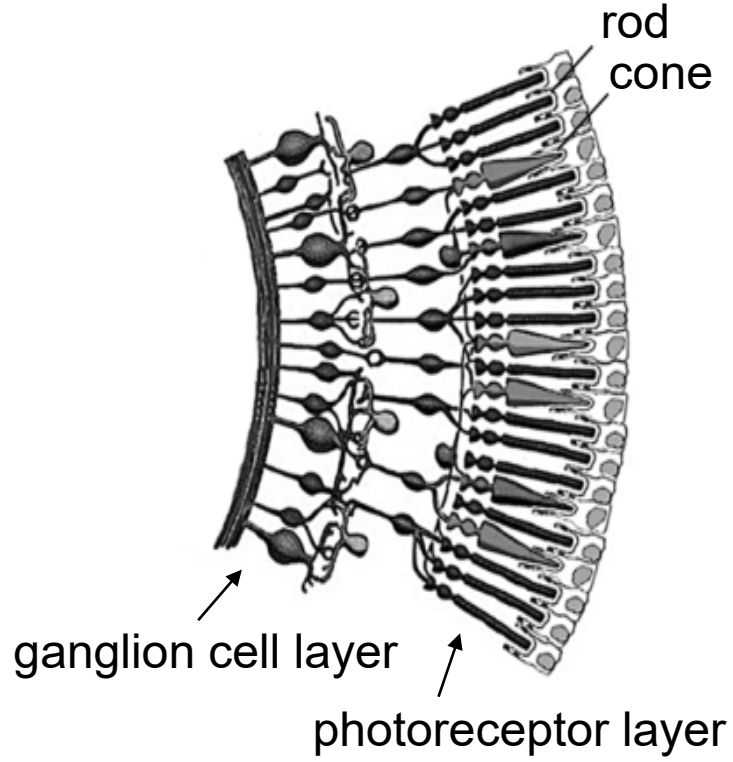
...one rule: think “opposite”

Schematic retina: right eye



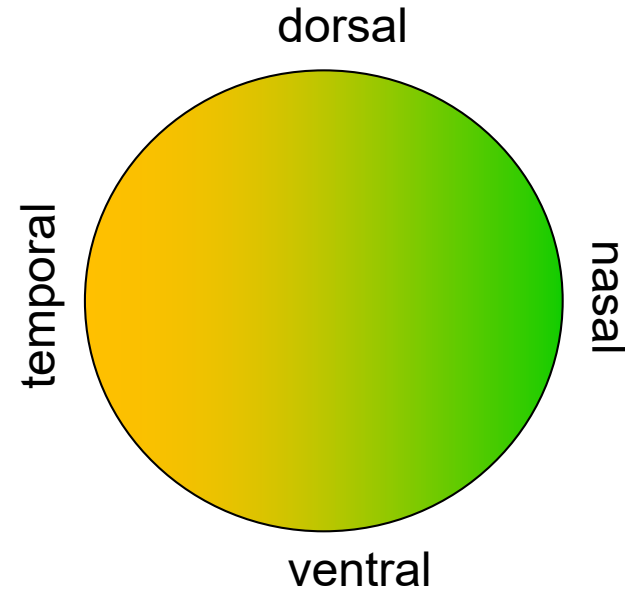
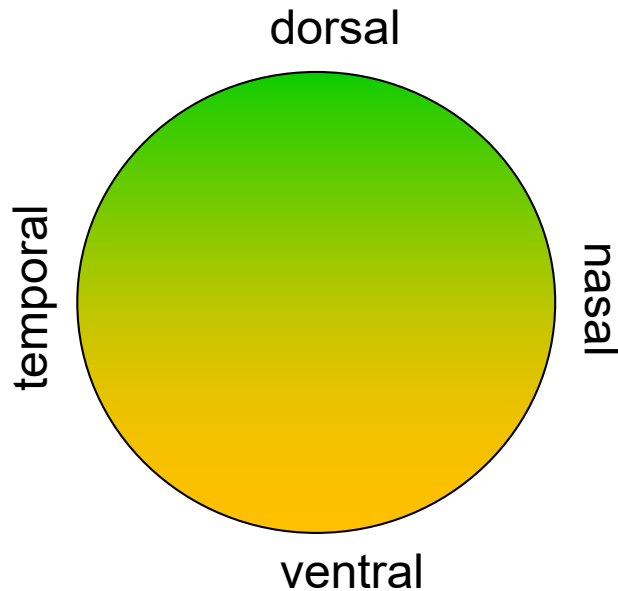
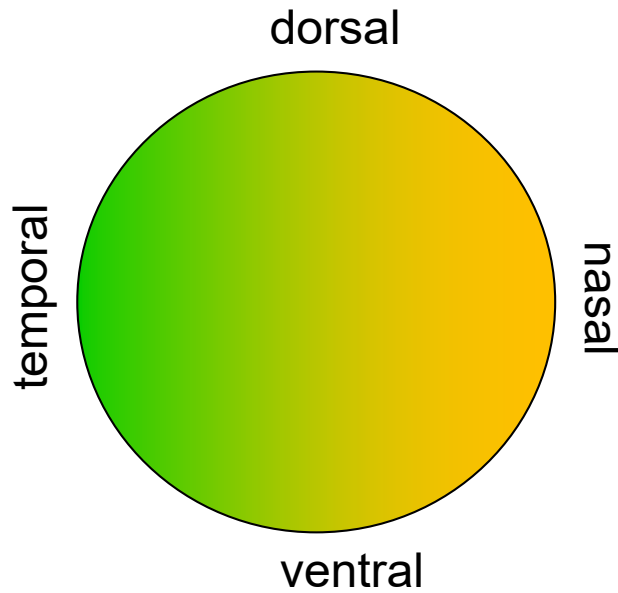
- dorsal looks ventral
- ventral looks dorsal
- nasal looks out
- temporal looks centre

SUMMATION



Schematic retina: right eye

ACUITY - SENSITIVITY



- dorsal looks ventral
- ventral looks dorsal
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Summary Key concepts – Introduction

Different areas of the retina capture information from specific parts of our surroundings.

The ratio of retinal ganglion cells to photoreceptors determines sensitivity vs acuity

Variation in the number of retinal ganglion cells across the retina means that different parts of our surroundings can be processed differently!

NEXT video: how is this applied in the animal kingdom?